Geotechnical Engineering Report
Mount Weather Generator Compound
Mount Weather
Clarke and Loudoun Counties, Virginia

Project No. 06230030 **April 10, 2006**

Schnabel Engineering North, LLC

Schnabel
Schnabel Engineering North, LLC

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June 13, 2006

Mr. Rafael T. Cervantes, P.E.
Cervantes & Associates, P.C.
3701 Pender Drive
Suite 110
Fairfax, Virginia 22030

Project: **Addendum to Geotechnical Engineering Report, Generator Compound, Mount Weather, Clarke and Loudoun Counties, Virginia (Our Contract No. 06230030)**

Dear Mr. Cervantes:

This letter has been prepared in accordance with our conversation of May 23, 2006 to revisit our bearing pressure recommendations and estimated settlement based on new, increased column loads.

Our Geotechnical Report dated April 10, 2006 recommended designing footings for an allowable bearing capacity of 2500 psf. This recommendation was based on the previously provided maximum column load of 30 kips. Settlement of spread footings sized for this load and bearing pressure was estimated to be less than one inch with differential settlement of three-quarters of an inch to be anticipated.

Information provided in correspondence since May 23rd indicates revised column loads varying from 18 to 107 kips due to the enlargement of the building and the addition of a mezzanine level. Provided the subsurface conditions and the revised column loads maximum footing settlement of 1½ inches has been estimated. Differential settlement resulting from differing column loads, and variation in the subsurface conditions of three-quarters of the maximum settlement should be expected. Spread footings should be constructed as recommended in our report dated April 10, 2006.

We have prepared this report for the use by the design professionals for design purposes in accordance with generally accepted geotechnical engineering practices. No warranty, express or implied, is made as to the professional advice included in this report.

We appreciate the opportunity to be of continued service to you on this project. Please contact the undersigned for further clarification of any aspect of this letter.

Sincerely,

SCHNABEL ENGINEERING NORTH, LLC

COMMONWEALTH OF VIRGINIA
WALTER
J.
RABE
No. 036595
PROFESSIONAL ENGINEER

Walter J. Rabe, P.E.
Senior Associate

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April 10, 2006
(Revised April 17, 2006)

Mr. Rafael T. Cervantes, P.E.
Cervantes & Associates, P.C.
3701 Pender Drive
Suite 110
Fairfax, Virginia 22030

Project: **Geotechnical Engineering Report, Generator Compound, Mount Weather, Clarke and Loudoun Counties, Virginia (Our Contract No. 06230030)**

Dear Mr. Cervantes:

Schnabel Engineering North, LLC (Schnabel Engineering) is pleased to submit this geotechnical engineering report for the above referenced project. This report has been prepared in accordance with our revised contract dated August 25, 2005 as authorized by your office on March 14, 2006.

Scope of Services

Services performed for this agreement included the drilling of six soil test borings, soil laboratory testing, engineering analysis, and preparation of this geotechnical engineering report. This geotechnical engineering report includes the following:

1. Evaluation of the estimated subsurface conditions for the proposed construction.
2. Recommendations regarding handling of groundwater during construction and in design.
3. Recommended foundation requirements for support of the proposed buildings and floor slabs on-grade.
4. Recommended lateral earth pressure diagram for use in the design of site retaining walls.
5. Recommendations for construction of loadbearing fills including an assessment of excavated site soils for use as structural fill and backfill.

6. Comments concerning global stability of slopes and walls, and recommendations for stabilization, if necessary.

7. Comments on rock excavation requirements and the identified depth where rock excavation methods may be required based on the test borings.

8. Assessment of subgrade conditions for support of flexible pavement and recommended California Bearing Ratio (CBR) value to use for pavement design. Pavement design will be performed by others.

9. Comments regarding geotechnical construction considerations for use in the design and construction plans and specifications.

Services with respect to environmental matters, specific construction dewatering recommendations, foundation recommendations, wetlands investigations, lateral earth pressures, pavement design, design of excavation support systems, erosion control, temporary slopes, cost or quantity estimates, plans, specifications, construction observation and testing, and services not specifically identified herein are not included in the scope of services. Soil samples recovered from the soil test borings will be retained until May 1, 2006 and will then be disposed of unless we are contacted concerning other arrangements.

We appreciate the opportunity to be of service for this project. Please contact either of the undersigned should you have any questions regarding this report.

Very truly yours,

SCHNABEL ENGINEERING NORTH, LLC

Mark M. Osowski, E.I.T.
Senior Staff Engineer

William J. Murphy, P.E.
Principal

COMMONWEALTH OF VIRGINIA
William J. Murphy
No. 030303
PROFESSIONAL ENGINEER

MMO/WJM/sam
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1.0 Executive Summary

Based on our evaluation of the subsurface conditions from the field investigation and the project data furnished to us, we have developed the following conclusions and recommendations. Detailed recommendations are presented in the body of this report.

- The soil test borings generally indicate subsurface conditions consisting of a surficial layer of topsoil underlain by up to 18.5 feet of soft to medium stiff residual fine grained soil (Stratum A) interlayered with medium to dense coarse grained residual soils of (Stratum B). Underlying the residual soil is disintegrated rock (Stratum C) which was only encountered in B-01 and B-02 at depths of 13.5 and 18.5 feet respectively.

- The proposed buildings may be supported by normal spread footings on new structural fill, crushed stone, or on the natural soils of Stratum A or B. We recommend a design bearing pressure of 2,500 psf for spread footings supported by new structural fill, crushed stone, or the natural soils of Stratum A or B as detailed herein. High plasticity soils of Stratum A should be expected at the proposed foundation bearing elevation. The high plasticity soils should be removed or the foundations should be stepped down to provide a minimum embedment of 6 feet as measured from the final exterior grade, whichever is less.

- Slabs on-grade may be supported on new structural fill or the natural soils of Stratum A or B. Where high plasticity soils of Stratum A are encountered at floor slab subgrades, the high plasticity soils should be removed to a depth of 2 feet, or in their entirety, and replaced with new structural fill or crushed stone as detailed herein. A minimum 4-inch thick washed gravel or crushed stone layer should be placed below floor slabs to serve as a drainage layer.

- Below-grade walls should be designed to resist lateral earth pressures. An equivalent fluid pressure of 60 psf may be used for below-grade wall design. Drainage behind the walls must be provided to reduce the possibility of hydrostatic pressures acting on the walls.

- Structural fill within the expanded building footprint should consist of soil classifying as CL, ML, SC, SM, SP, SW, GC, GM, GP, or GW per ASTM D-2487 with a liquid limit less than 45 and a plasticity index less than 20. The site soils tested in our soil mechanics laboratory were found to have liquid limits of 45 and greater for all soil tested. This indicates that the site soils contain highly plastic fines and are not considered suitable for use as structural fill. Excavated site soils not suitable for use as structural fill may be used in site non-structural landscaping or "green" areas, and excess soil will need to be removed and disposed off-site. Structural fill should be compacted to at least 95 percent of the maximum dry density per the Standard Proctor Method (ASTM D-698).

- Pavements will be supported on new structural fill or natural soils of Strata A and B. The high plasticity soils of Stratum A are not suitable for direct support of pavements and should be removed to a depth of 2 feet and replaced with new structural fill as detailed herein. Based on our experience, we recommend a preliminary California Bearing Ratio (CBR) value of 5 for the site soils. Actual CBR values will vary and should be evaluated during construction.

- Based on the existing grades at the site and the proposed construction, rock excavation may be necessary during foundation and utility installation. Recommendations for rock excavation are contained within this report.

- Earthwork construction should be observed by Schnabel Engineering to verify that the work is performed in accordance with the recommendations contained in this report. We can provide construction phase services as an extension of our current agreement, if requested.

- An allowance should be established to account for additional costs that may be required to develop the site as recommended in this report. Additional costs may be incurred for various reasons, including rock and/or boulder excavation, soft subgrade conditions, removal of surficial boulders, removal of stumps and debris, removal (potentially off-site) and replacement of high plasticity soils, difficulty in obtaining structural fill compaction, etc.

2.0 Description of Site and Proposed Construction

The proposed building is located at the 434-acre Mt. Weather Emergency Assistance Center (MWEAC) in Western Loudoun County, Virginia. The site is bounded to the north by a water line easement, to the east by a roadway, and to the south by an existing paved parking area. A vicinity map depicting the general location of the site is presented as Figure 1. The site is heavily wooded with mature deciduous trees. The ground surface and upper few feet of soil generally contains a considerable amount of boulders. Areas containing concentrated amounts of boulders were noted on provided plans. An unpaved access road exists on the eastern edge of the site. There is a large pile of deteriorating stumps and logs, boulders and other debris located in the southwestern portion of the lot. This material reportedly was moved to its current location during previous grading activities. The site is moderately sloping from a high at the east access road and down in the westerly direction. Specific details about the existing topography and elevations were not provided.

Available plans indicate that the proposed development will consist of the construction of an approximately 5,000 square foot one-story generator/mechanical building, fuel tank storage shelter, and a retaining wall. The proposed construction will be slab on-grade. The generator/mechanical building may have some isolated below grade portion(s). Maximum column and wall loads were provided as 30 kips and 2 kips per foot respectively. The finish floor elevation of the fuel tanks storage area is proposed to be 1,616 feet placing it roughly at grade. Finish floor elevation for the mechanical building is to be placed at 1,614 feet. This will raise the grade as much as eight feet. The northwest corner of the mechanical building fill will be retained by a retaining wall, which tapers into an embankment in the southwesterly direction. Details of wall height(s) and the proposed grading plans have not been provided.

The above information was obtained from site plans prepared by Cervantes & Associates, P.C., discussion with MWEOC personnel, and site reconnaissance performed by Schnabel Engineering personnel.

3.0 Subsurface Investigation

To evaluate subsurface conditions for the proposed project, six soil test borings were drilled under our direction by Connelly and Associates, Inc. on March 16, 2006. The results of the soil test borings and details regarding the procedures for drilling soil test borings are presented in the Subsurface Investigation, Appendix A. The soil test borings were located by others as shown on the Boring Location Plan, Figure A1.

3.1 Stratification

Soils encountered in the subsurface investigation have been designated by strata for the purpose of our discussion herein. These stratum designations do not imply continuity of the materials described, but give the general descriptions and characteristics of the materials at the site. The generalized soil strata are:

Stratum A: (Residual)	Below topsoil, encountered to a depth up to 18.5 feet.	Brown, orange-brown, yellowish-brown, and reddish-brown ELASTIC SILT (MH), with variable amounts of sand, rock fragments, roots and organics; generally very soft to stiff consistency (N = 1 to 17).
Stratum B: (Residual)	Interlayered with Stratum A encountered to a depth of 15 feet. Only encountered in B-04 and B-06	Brown and greenish-brown, silty ROCK FRAGMENTS (GM) and silty SAND (SM), with variable amounts of sand and rock fragments, generally medium dense to dense (N = 12 to 38).
Stratum C: (Residual)	Below Strata A and B, encountered at depths below 13.5 feet. Only encountered in Borings B-01 and B-02.	Yellowish-brown, DISINTEGRATED ROCK; consisting of variable amounts of silt, sand, and rock fragments; generally very dense consistency (N = 63 to 100+).

Auger refusal was encountered in borings B-05 and one offset boring, B-05A at depths of 4.0 and 4.5 feet. It is not clear whether a very large boulder caused auger refusal, or if bedrock was encountered. Topsoil was observed in the soil test borings to a depth of about six inches. However, the topsoil depths reported herein should not be considered as an indication of stripping depths for earthwork considerations since the depth of stripping is dependent on other factors such as the equipment used, consistency and moisture content of near surface soils, presence of root systems, buried stockpiles of topsoil, and other similar factors.

Numbers after the description of the soil strata indicate the minimum and maximum penetration resistance, or "N" value, in each stratum. The group symbols indicated by two capital letters on the boring logs and in the subsurface stratification represent the Unified Soil Classification System (ASTM D-2488) group symbols based on visual observation of the samples recovered. Explanation of "N" values and criteria for visual identification of soil samples is given in Appendix A. There may be variations between samples visually classified and specimens where laboratory tests have been used for classification.

3.2 Geology

The site is located within the Blue Ridge Physiographic Province of Virginia. The Blue Ridge is generally characterized as a gently rolling erosional surface underlain by Proterozoic and Paleozoic igneous and metamorphic rocks. The Blue Ridge is typically blanketed with a shallow residual soil layer, or saprolite, and depths to bedrock are typically 5 to 15 feet. The Blue Ridge is bordered to the east by the Piedmont and to the west by the Valley and Ridge.

The natural soils of Strata A, B, and C are believed to be residual materials derived from the in-place weathering of the underlying metabasalt bedrock of the Catoctin Formation.

3.3 Groundwater Observations

Groundwater level observations were made in the soil test borings during drilling operations and after completion of drilling. Groundwater was not encountered during drilling or observed in the borings to the depths borings caved.

Water level measurements obtained during the subsurface investigation are an indication of groundwater levels at the times indicated on the boring logs. However, fluctuations in groundwater levels, especially perched water conditions at soil/rock interface should be expected with variations in factors such as precipitation, evaporation, surface runoff, construction activity, and other similar factors.

3.4 Soil Laboratory Testing

Selected soil samples recovered from the soil test borings were submitted to our soil mechanics laboratory for classification, grain size analysis and natural moisture content testing. Detailed laboratory test results are presented in Appendix B.

Four samples of the natural soils of Stratum A classified as ELASTIC SILT (MH) with sand, sandy ELASTIC SILT (MH), and sandy ELASTIC SILT (MH) with rock fragments per ASTM D-2487 with approximately 0 to 21 percent rock fragments retained on the U.S. Standard No. 4 sieve, from 54 to 78 percent fines passing the U.S. Standard No. 200 sieve, liquid limits from 51 to 64, plasticity indices of 12 to 22, and natural moisture contents of 26.0 to 35.5 percent.

Three samples of the natural soils of Stratum B classified as silty SAND (SM), silty SAND (SM) with rock fragments, and silty ROCK FRAGMENTS (GM) with sand per ASTM D-2487 with approximately 9.7 to 31.2 percent rock fragments retained on the U.S. Standard No. 4 sieve, 28.9 to 49.3 percent fines passing the U.S. Standard No. 200 sieve, liquid limits of 45 to 62, a plasticity indices of 8 to 19, and natural moisture contents of 21.8 to30.5 percent.

4.0 Engineering Analysis and Recommendations

The subsurface conditions revealed by the field exploration program indicate that the site is suitable for the proposed development. However, existing fill soils and high plasticity soils that are considered unsuitable for direct support of foundations were encountered at the site. Additional costs should be expected during foundation installation for partial removal and replacement of high plasticity soils. Recommendations and details regarding foundations, floor slabs, lateral earth pressures, and earthwork are provided herein.

4.1 Foundations

The natural soils of Stratum B are considered suitable for direct support of spread footing foundations. Building column and continuous wall footings may be designed using an allowable bearing pressure of 2,500 psf for footings bearing on suitable natural soils of Stratum B for the column and wall loading provided. Should the column loads increase in excess of the provided 30 kip loading, this bearing pressure would need to be reevaluated.

If high plasticity soils of Stratum A are encountered at the proposed bearing elevation, foundation subgrades should be lowered through the high plasticity soils, or to a depth of six feet below exterior grades, whichever is less. The resulting excavation may be backfilled with structural fill, crushed stone, or lean concrete (Figure 2).

Column and wall footings should be at least 30 inches and 20 inches wide, respectively, for bearing shear considerations. The bottom of exterior footings should be placed at least three feet below final exterior grade for frost protection. Adjacent footings founded at different elevations should be designed with a minimum slope of one horizontal to one vertical between footing edges.

Total footing settlements are estimated to be less than one inch and differential settlement between adjacent similarly loaded footings should not exceed about three-quarters of the total estimated settlement. We have assumed that the mechanical equipment to be housed in these structures do not produce large vibrations and do not have any particular sensitivity to settlement or differential settlement, because none has been indicated. Should more stringent limits be placed on settlement these recommendations will need to be revised.

4.2 Floor Slabs

Earth supported floor slabs are considered feasible. Based on the proposed floor slab elevation, the natural soils of Strata A and B will likely be encountered at the floor slab elevations. Where high plasticity soils of Strata A are encountered at floor slab subgrades, the high plasticity soils should be removed to a depth of 2 feet or in their entirety, whichever is less. The floor subgrade should then be proof rolled to identify any unsuitable areas still present at the floor slab elevation after recompaction. Any unsuitable soils identified during the proof rolling should be removed to a maximum depth of 2 feet, or to suitable soils, and replaced with structural fill or crushed stone. The amount of undercut should be evaluated by the Geotechnical Engineer during construction.

Where possible, floor slab subgrades should be proof rolled using a loaded 10-ton dump truck or other suitable weight rubber-tired construction equipment to assess the suitability of the subgrade soils. All debris and soft or loose soils near the final floor slab subgrades noted during the proof roll, and as a result of construction operations, should be stripped and removed prior to placement of the granular base course.

A 4-inch minimum thickness of washed gravel or crushed stone (VDOT No. 57) should be provided below the floor slabs to serve as a drainage layer. A minimum 6-mil thick impermeable plastic membrane should be placed over the drainage layer to serve as a vapor barrier and to prevent infiltration of concrete into the drainage layer during concrete placement.

4.3 Pavements

New structural fill or natural soils of Stratum A will be encountered at pavement subgrades. New structural fill will be necessary to provide adequate support for pavements. When the high plasticity soils of Stratum A are encountered at pavement subgrades, the high plasticity soils should be removed to a depth of 2 feet and replaced by new structural fill.

Subgrade preparation for pavement areas should include stripping of topsoil and any unsuitable (soft) soils, placing structural fill as necessary, and recompacting the subgrades immediately below pavements. Pavement subgrades should be proofrolled with a minimum 10-ton loaded dump truck or other suitable weight rubber-tired construction equipment immediately prior to placing new structural fill and base course stone material. Specific material and compaction requirements for structural fills placed in pavement areas are included in Section 4.5.

We recommend an estimated California Bearing Ratio (CBR) value of 5 for the site soils based on our experience. However, representative pavement subgrade soil samples should be obtained for CBR testing during construction.

The overall grading design should include storm inlets and diversion structures for collecting surface runoff and to limit ponding on paved surfaces. Underdrains and intermediate drainage layers are not considered necessary based on the data obtained from the subsurface investigation. However, if perched water conditions are encountered during construction, it may be necessary to incorporate underdrains into remedial design measures. If underdrains are necessary, we recommend the use of a VDOT UD-4 underdrain. The materials and gradation of the asphaltic concrete pavement and subbase courses should be in conformance with the VDOT Road and Bridge Specifications.

We recommend that concrete pavements be placed at planned dumpster sites or areas where heavy load/unload conditions are present due to highly concentrated wheel loads. The concrete pavement should be a minimum of 5 inches thick and should be supported by a minimum of 6 inches of crushed stone. The concrete should be air-entrained with a 28-day compressive strength of at least 4,000 psi and should be reinforced.

4.4 Lateral Earth Pressures

Below-grade and site retaining walls structurally separate from adjacent structures should be designed to resist lateral earth pressures developed from the surrounding soil, rock, backfill, and surcharge loads. An active lateral earth pressure of 40H psf is recommended for design of site retaining walls with level backfill and an at-rest lateral earth pressure of 60H is recommended for design of the below-grade walls with level backfill where H is in feet as indicated in Figures 3 and 4. A passive earth pressure of 250H psf is recommended for design of site retaining walls with level toe slopes. The equivalent fluid pressures for the walls assumes that any groundwater, surface infiltration, or perched water in the soils surrounding the walls are collected and disposed of by a subdrainage system as shown in Figure 4.

In addition to the lateral earth pressure from backfill and surrounding soils, walls should also be designed to resist surcharge loads within a 45-degree slope from the bottom of the walls. Lateral earth pressures from surcharge loads can be estimated with a uniform lateral pressure equal to the lateral earth pressure coefficient times the vertical surcharge pressure as shown in Figure 3. Backfill material should meet the specifications and compaction requirements for backfill against walls as detailed in Section 4.5, Earthwork.

4.4 Global Retaining Wall and Slope Stability Recommendations

No details regarding proposed site grading including the proposed embankment west of the mechanical building or retaining wall height(s) have been provided at this writing. Details of the global stability of retaining walls and site slopes may be addressed in a later addendum to this report as requested.

4.5 Earthwork

Based on the site topography and proposed grades, we assume that cuts and fills will generally be less than approximately ten feet excluding excavations for a below-grade level or utility trenches. Unsuitable soft or loose soils, including topsoil, and organic material should be undercut to approved subgrades as indicated by the Geotechnical Engineer. All subgrades should be proof rolled with a minimum 10-ton loaded dump truck or other suitable weight rubber-tired construction equipment under the observation of the Geotechnical Engineer immediately prior to the placement of new fill.

Soils placed within the expanded building footprint should classify as CL or more granular per ASTM D-2487 with a liquid limit less than 45 and a plasticity index less than 20 for soil to be placed as structural fill. None of the soil submitted for laboratory classification met these criteria.

Structural fill should extend at least 5 feet beyond the proposed building footprint. Structural fill should be compacted in lifts not exceeding 8 inches loose thickness to at least 95 percent of the maximum dry density per ASTM D-698.

The site soils may be difficult to compact, especially if the soils become wet. Drying of the on-site soils by spreading and aerating may be necessary to obtain proper compaction in areas. However, this may not be practical during wet periods of the year. Earthwork operations should be planned for the late Spring, Summer and early Fall when drier weather conditions are most likely.

Individual borrow areas should be sampled and tested to verify classification of materials and moisture-density relationships prior to their use as structural fill.

5.0 Construction Consideration

5.1 Spread Footings

Footing subgrades should be observed by the Geotechnical Engineer to evaluate whether the soils are suitable for the recommended bearing pressure and that subgrades have not become excessively disturbed. Footings should be concreted the same day the excavations are completed to reduce disturbance of footing subgrades by exposure to precipitation, water seepage, weather conditions, and construction operations. Any disturbed subgrade soils should be removed prior to concreting footings. Undercuts should be filled with crushed stone or structural fill.

Forming of footings may be used if necessary. However, less subgrade disturbance will occur if footings are poured directly against the soil. Therefore, we recommend that forming of footings be avoided where possible. If forms are used, they should be removed and the excavations backfilled as soon as possible. Water should not be permitted to pond around footing excavations.

5.2 Floor Slab Subgrades

Floor slab subgrades should be observed by the Geotechnical Engineer prior to placement of the granular base course. Proof rolling using a 10-ton loaded dump truck or other suitable weight rubber-tired construction equipment should be performed where possible. In areas where it will not be feasible to use a dump truck for proof rolling, other means will be required to evaluate suitability of subgrade soils, such as by use of a dynamic cone penetrometer, geostick penetrometer, etc. The Geotechnical Engineer should decide which equipment is best for evaluating subgrade soils on the site during construction. All loose materials should be removed and the excavated surface observed to evaluate whether additional excavation may be necessary. Where the subgrade is unsuitable or where soils have been disturbed during construction activity, the disturbed or unsuitable materials should be removed and replaced with structural fill, crushed stone, or lean concrete as detailed herein.

5.3 Earthwork

Structural fill should consist of material free of deleterious matter such as organics or rock greater than 3 inches in largest dimension, and should classify as CL, ML, SM, SC, SP, SW, GC, GM, GP, or GW per ASTM D-2487. The structural fill soils should have a liquid limit less than 45 and a plasticity index less than 20 when tested in accordance with ASTM D-4318.

The natural moisture contents of on-site soils are expected to vary widely. Scarifying and drying of some of the fill soils may be required to achieve proper compaction. Careful planning of fill operations to allow drying time for individual fill lifts may be required. We expect the site to be large enough to allow time for the fill lifts to be scarified and allowed to dry. Significant delays, difficulties using the on-site soils as structural fill, and additional earthwork costs should be expected, particularly if the earthwork operations occur from December to March.

5.4 High Plasticity Soils

High plasticity soils comprising Stratum A were encountered on-site. Coarse-grained Stratum B soils were also found to contain highly plastic material. Problems associated with high plasticity soils include shrink-swell potential, poor or soft subgrade support when wet, and difficulties with respect to proper compaction when placed in a structural fill. If exposed to excessive moisture or disturbance, these soils will become unstable, and unsuitable for subgrade support of fill and will require removal prior to fill placement. High plasticity soils are not suitable for placement in a controlled fill within the expanded building footprint.

Where high plasticity soils are encountered at floor slab or pavement subgrades, the high plasticity soils should be removed to a depth of 2 feet or in their entirety, whichever is less. If high plasticity soils are encountered at proposed footing subgrade elevations, the foundations should be lowered down to provide a minimum embedment of 6 feet as measured from the finished exterior grade. The resulting excavation may be backfilled with lean concrete or structural fill.

5.5 Rock Excavation

It is estimated that elevations at the soil test boring locations where rock excavation methods such as hoe-ramming or blasting may be required are about 1 to 2 feet below the auger refusal depth on the boring logs. This elevation is based upon the use of normal earth excavation equipment including up to a D-8 Caterpillar tractor, equipped with a single tooth ripper or equivalent, for mass excavation. For trench excavations, rock excavation should be defined in terms of a CAT 330 hydraulic backhoe, or equivalent, instead of the D-8 Caterpillar tractor.

We recommend that the project specifications include the following as a definition of rock excavation for mass or trench excavation:

> Rock is defined as any material which cannot be dislodged by a D-8 Caterpillar tractor, or equivalent, equipped with a hydraulically operated, single tooth power ripper, or in the case of trench excavations, a Caterpillar 330 hydraulic trackhoe, or equivalent, without the use of hoe-ramming or blasting. This classification does not include material such as loose rock, concrete, or other materials that can be removed by means other than hoe-ramming or blasting, but which for reasons of economy in excavating, the contractor chooses to remove by hoe-ramming or blasting.

Earth excavation should be defined as all material except rock as defined above, including material that must be ripped. Please note that if smaller equipment than referenced herein is used for excavation operations, the depth to where rock excavation methods are required will decrease.

An alternative would be to bid all excavation as unclassified with the same unit price applying to soil and rock excavation.

5.6 Geotechnical Observations During Construction

Variations in soil conditions will be encountered during construction. To permit correlation between the subsurface investigation data and subsurface conditions encountered during construction, it is recommended that the Geotechnical Engineer provide observations during construction. Construction inspection services should include observation of earthwork operations, evaluation of suitability of subgrade materials for foundation and floor slab support, and consultation on matters related to earthwork and foundations.

6.0 Limitations

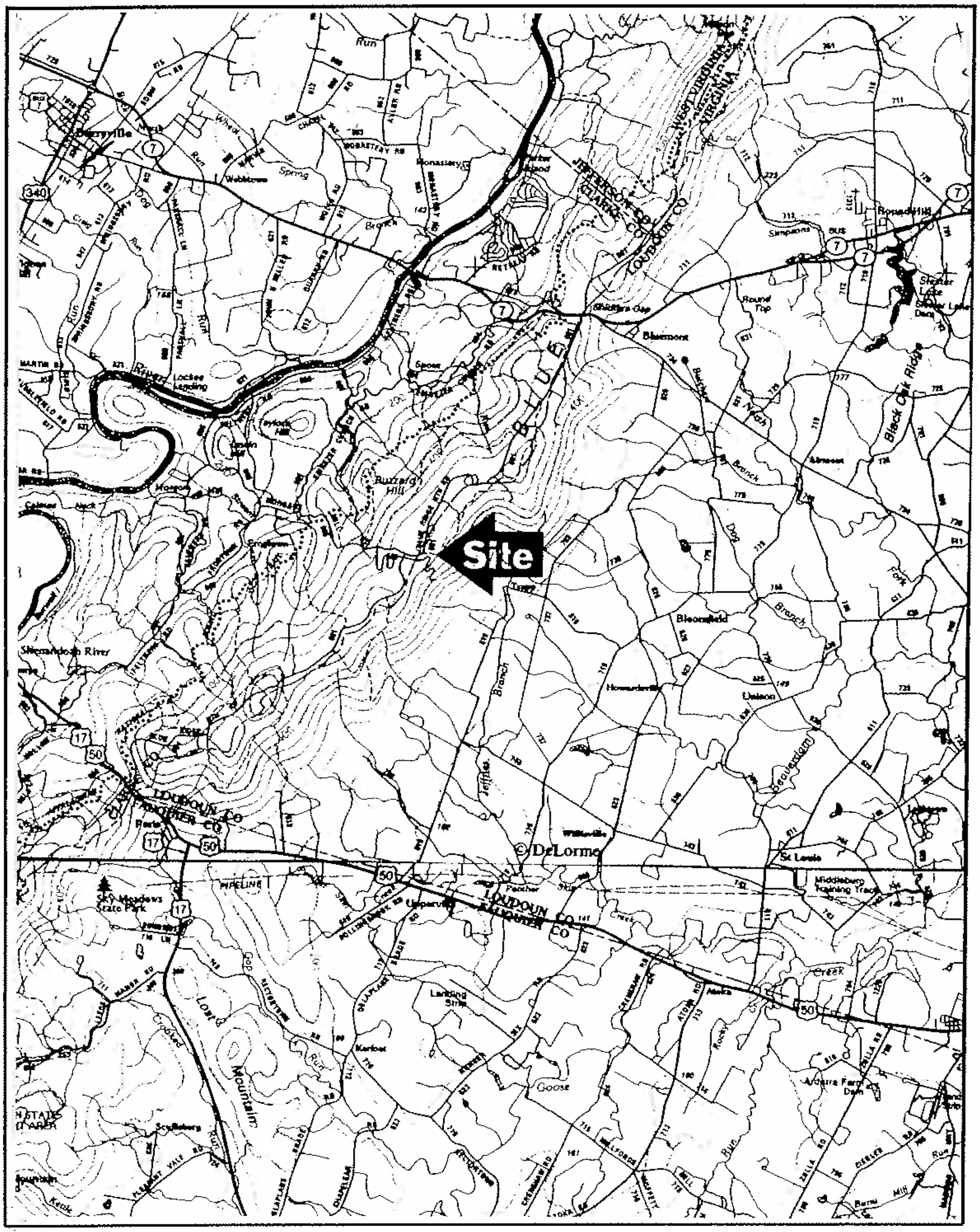
This report has been prepared to aid in the evaluation of the site and to assist the design professionals in the design of this project. It is intended for use with regard to the specific project as described herein. Substantial changes in proposed construction, tolerable settlements, building location, loads, etc., should be brought to our attention so that we may evaluate the effect on the recommendations given herein.

Recommendations contained in this report are based on data obtained from the relatively limited number of soil borings performed at the locations given herein. This report does not reflect variations that may occur between these soil borings. The nature and extent of variations between soil borings may not become evident until during the construction period. It is essential for successful completion of this project that on-site observations of subgrade conditions be performed during construction to evaluate if additional design recommendations are necessary.

This report should be made available to bidders prior to submitting their proposals and to the successful contractor and subcontractors for their information only, and to supply them with facts relative to the subsurface investigation, soil laboratory tests, etc. We recommend that the project specifications contain the following statement:

> "A geotechnical engineering report has been prepared for this project by Schnabel Engineering North, LLC. This report is for informational purposes only and should not be considered part of the contract documents. The opinions expressed in this report are those of the Geotechnical Engineer and represent his interpretation of the subsurface conditions, tests and the results of analyses that he performed. Should the data contained in this report not be adequate for the contractor's purposes, the contractor may make his own investigations, tests, and analyses prior to bidding."

We have prepared this report for the use of the design professionals for design purposes in accordance with generally accepted geotechnical engineering practices. No warranty, express or implied, is made as to the professional advice included in this report.



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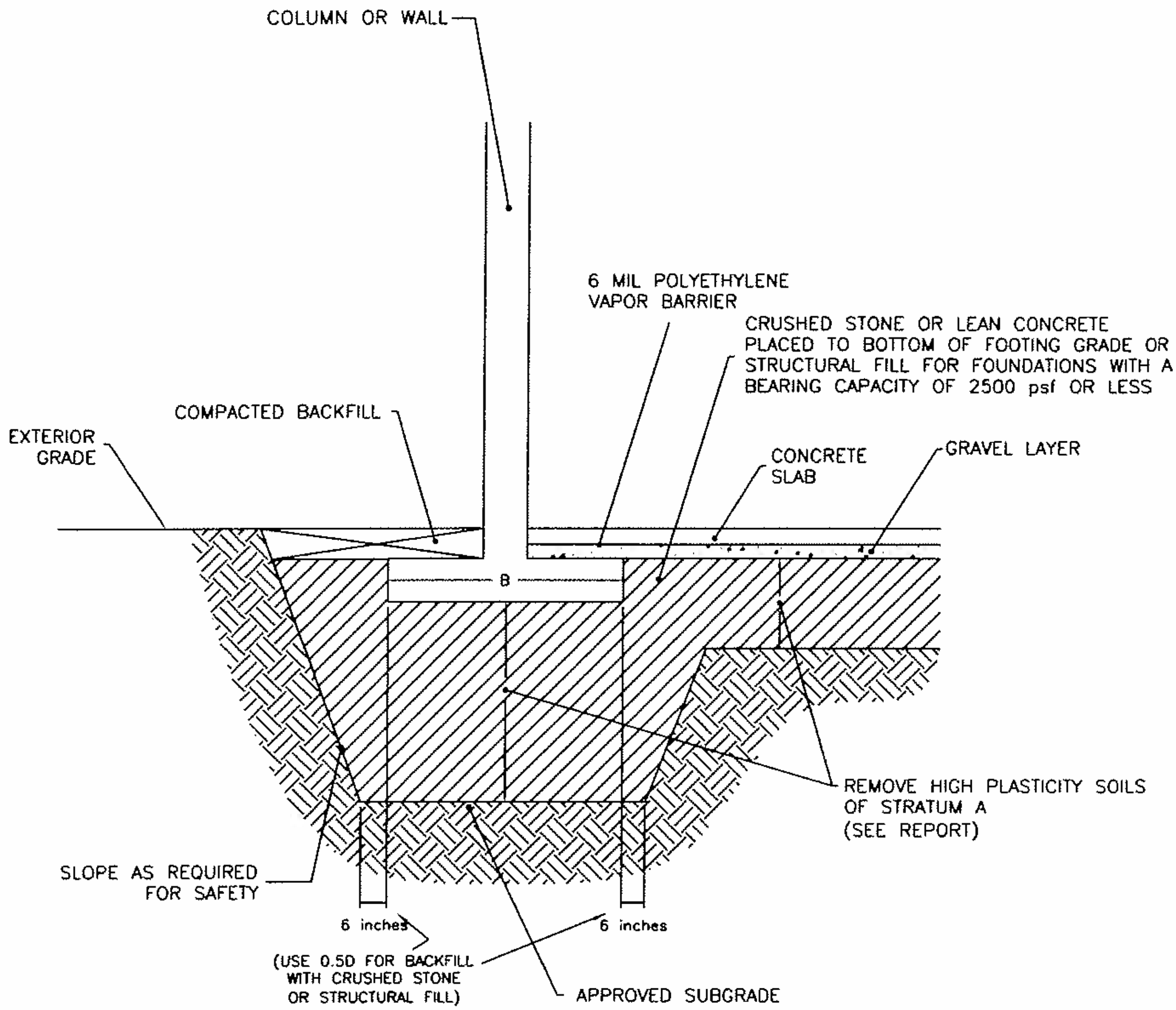
MOUNT WEATHER GENERATOR COMPOUND
CLARKE AND LOUDOUN COUNTIES, VIRGINIA

SITE VICINITY MAP

DATE:	DRAWN BY:	CONTRACT No.:
4-10-06	MMO	06230030
SCALE:	CHECKED BY:	FIGURE No.:
1" = 2000'	WJM	1



TYPICAL SECTION

NOT TO SCALE

NOTES:

1. EXTERIOR FOOTING TO BE A MINIMUM OF 3 FT BELOW EXTERIOR GRADE.
2. SEE REPORT FOR STRUCTURAL FILL AND CRUSHED STONE REQUIREMENTS.

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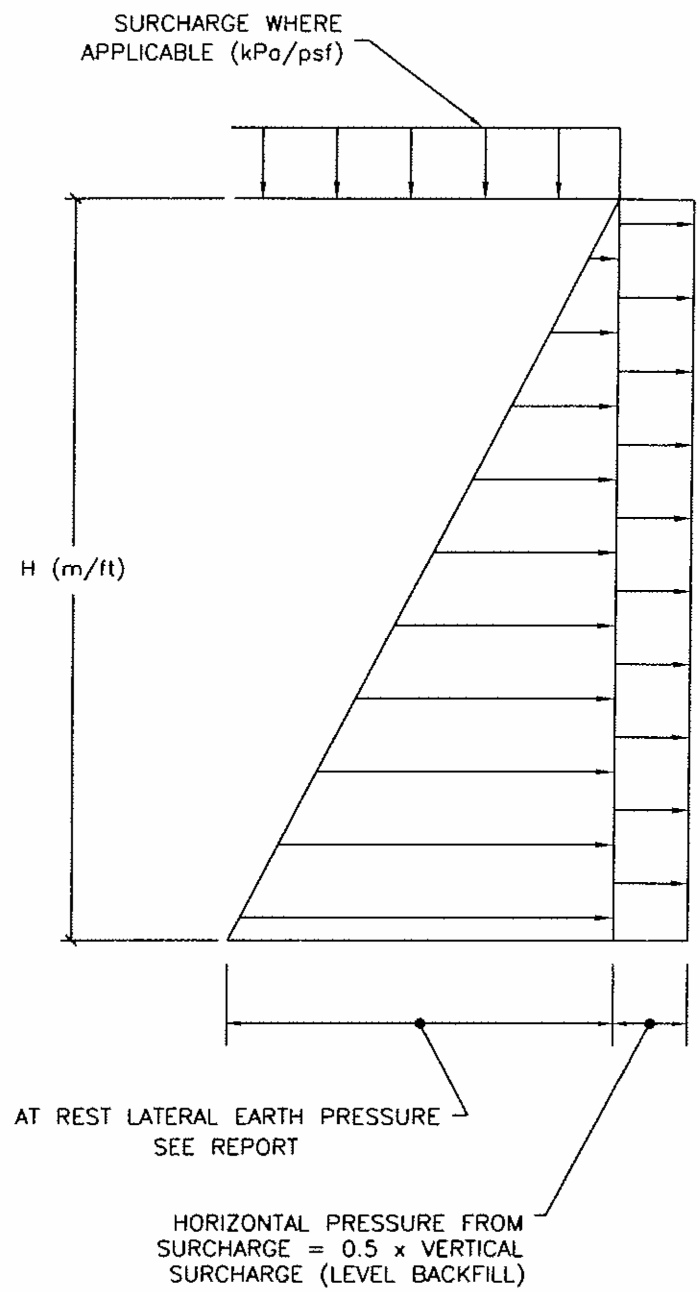
MOUNT WEATHER GENERATOR COMPOUND
CLARKE AND LOUDOUN COUNTIES

FOOTING UNDERCUT DETAIL	DATE: 4-10-06	DRAWN BY: MMO	CONTRACT No.: 06230030
	SCALE: NTS	CHECKED BY: WJR	FIGURE No.: 2



EARTH PRESSURE NOTES

1. EARTH PRESSURE DIAGRAM SHOWN ASSUMES FULL DRAINAGE OF HYDROSTATIC PRESSURE.

2. SEE REPORT FOR BACKFILL MATERIAL REQUIREMENTS.

G:\06230030\CAD\figures\LEP - Below Grade Wall.dwg

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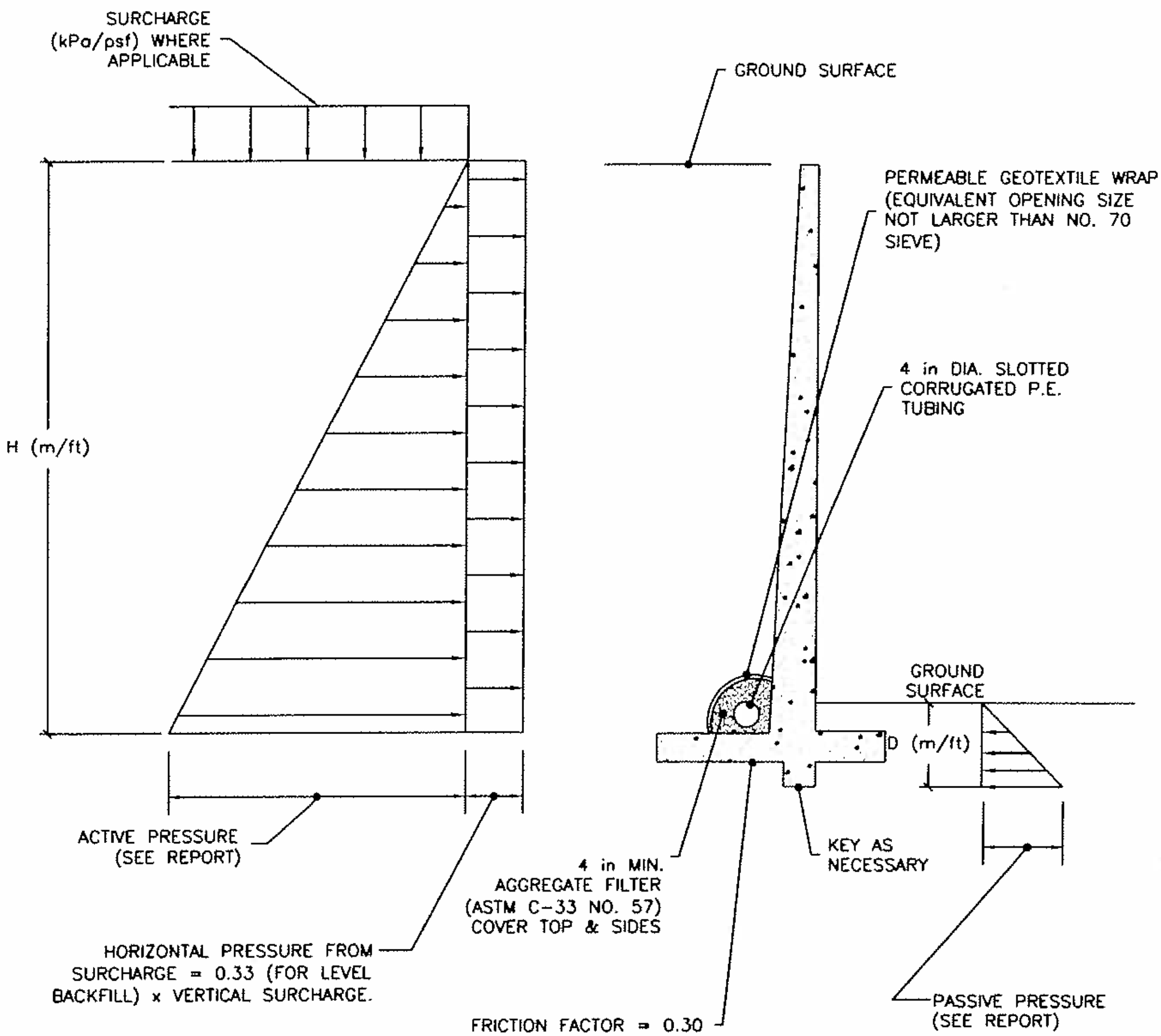
MOUNT WEATHER GENERATOR COMPOUND
CLARKE AND LOUDOUN COUNTIES, VIRGINIA

LATERAL EARTH PRESSURE DIAGRAM FOR BELOW-GRADE WALLS	DATE: 4-10-06	DRAWN BY: MMO	CONTRACT No.: 06230030
	SCALE: NTS	CHECKED BY: WJM	FIGURE No.: 3



EARTH PRESSURE NOTES

1. PRESSURE DIAGRAM SHOWN ASSUMES FULL DRAINAGE OF HYDROSTATIC PRESSURE.
2. SEE REPORT FOR BACKFILL REQUIREMENTS.

G:\05230124\CAD\figures\LEP – Retaining Wall.dwg

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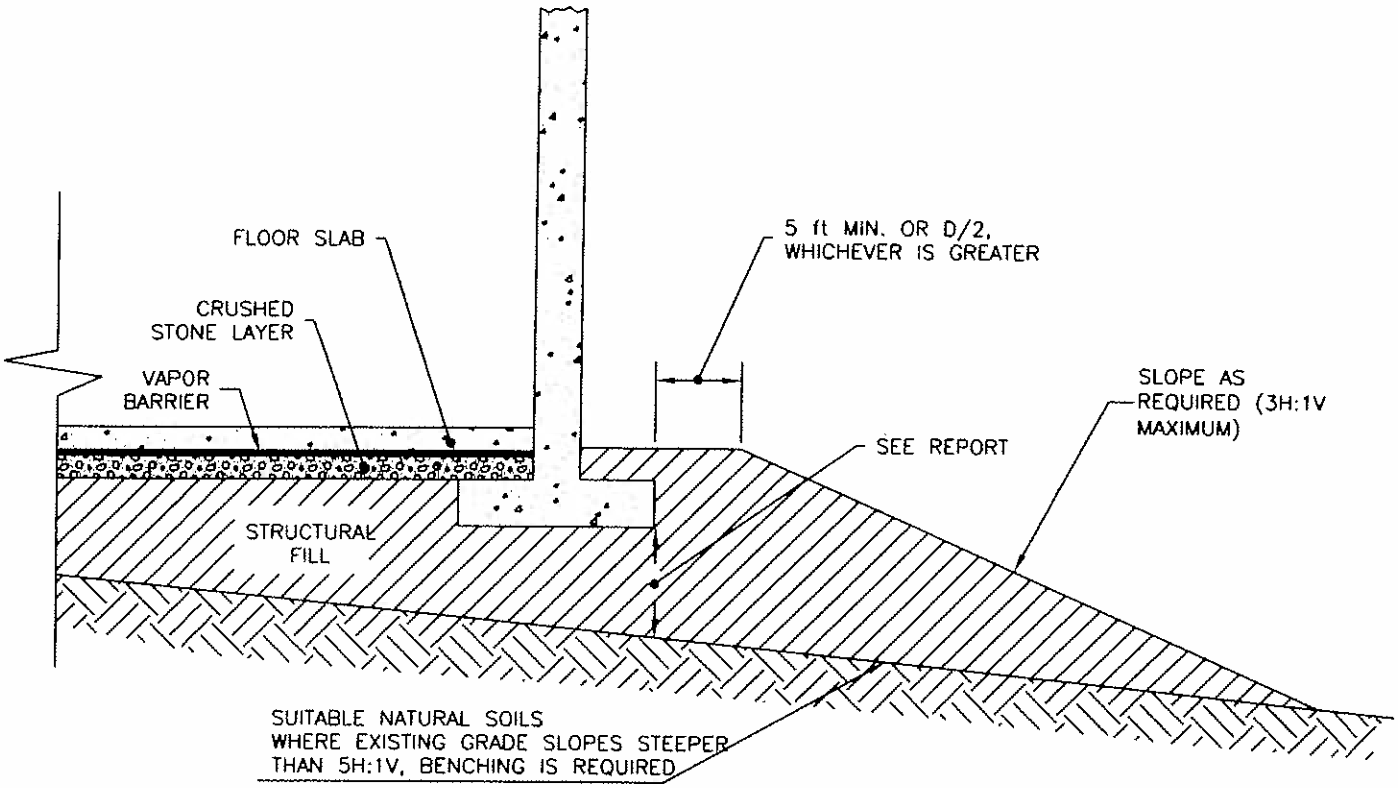
CLARKE AND LOUDOUN COUNTIES, VIRGINIA

LATERAL EARTH PRESSURE DIAGRAM FOR SITE RETAINING WALLS	DATE: 4-10-06	DRAWN BY: MMO	CONTRACT No.: 06230030
	SCALE: NTS	CHECKED BY: WJM	FIGURE No.: 4



G:\06230030\CAD\figure2.DWG

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(703) 779-0773 (703) 443-0510 FAX

MOUNT WEATHER GENERATOR COMPOUND
CLARKE AND LOUDOUN COUNTIES, VIRGINIA

GENERAL RECOMMENDATIONS FOR STRUCTURAL FILL	DATE: 3-31-06	DRAWN BY: MMO	CONTRACT No.: 06230030
	SCALE: NTS	CHECKED BY: WJM	FIGURE No.: 5

APPENDIX A
SUBSURFACE INVESTIGATION

- Subsurface Investigation Procedures
- Identification of Soil
- Test Boring Log General Notes
- Test Boring Logs
- Figure A1 - Boring Location Plan

Subsurface Investigation Procedures

1. Test Borings - Hollow Stem Augers

   The borings are advanced by turning an auger with a center opening of 2-1/4 to 3-1/4 inches. A plug device blocks off the center opening while augers are advanced. Cuttings are brought to the surface by the auger flights. Sampling is performed through the center opening in the hollow stem auger, by standard methods, after removal of the plug. Usually, no water is introduced into the boring using this procedure.

2. Standard Penetration Tests

   Testing is performed by driving a 2-inch O.D., 1-3/8 inch I.D. sampling spoon through three 6-inch intervals or as indicated, using a 140-pound hammer falling 30 inches, according to ASTM D-1586.

3. Boring Locations and Grades

   Test borings were located in the field by Schnabel Engineering personnel using existing site features. Elevations at the boring locations are based on plans provided to us.

SCHNABEL ENGINEERING NORTH

Consulting Geotechnical Engineers

IDENTIFICATION OF SOIL

I. DEFINITION OF SOIL GROUP NAMES ASTM D-2487-83

			Symbol	Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels - More than 50% of coarse fraction retained on No. 4 sieve Coarse, ¾" to 3" Fine, No. 4 to ¾"	Clean Gravels Less than 5% fines	GW	Well graded gravel
			GP	Poorly graded gravel
		Gravels with Fines More than 12% fines	GM	Silty gravel
			GC	Clayey gravel
	Sands – 50% or more of coarse fraction passes No. 4 sieve Coarse, No. 10 to No. 4 Medium, No. 40 to No. 10 Fine, No. 200 to No. 40	Clean Sands Less than 5% fines	SW	Well-graded sand
			SP	Poorly graded sand
		Sands with fines More than 12% fines	SM	Silty sand
			SC	Clayey sand
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays - Liquid Limit less than 50 Low to medium plasticity	Inorganic	CL	Lean clay
			ML	Silt
		Organic	OL	Organic clay
				Organic silt
	Silts and Clays - Liquid Limit 50 or more Medium to high plasticity	Inorganic	CH	Fat clay
			MH	Elastic silt
		Organic	OH	Organic clay
				Organic silt
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	Peat

II. DEFINITION OF MINOR COMPONENT PROPORTIONS

Minor Component Adjective Form	Approximate Percentage of Fraction by Weight
Gravelly, Sandy	30% or more coarse grained
With	
Sand, Gravel	15% or more coarse grained
Silt, Clay	5% to 12% fine grained
Trace	
Sand, Gravel	Less than 15% coarse grained
Silt, Clay	Less than 5% fine grained

III. GLOSSARY OF MISCELLANEOUS TERMS

SYMBOLS - Unified Soil Classification Symbols are shown above as group symbols. Use A Line Chart for laboratory identification. Dual symbols are used for borderline classification.

BOULDERS & COBBLES - Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inches.

DISINTEGRATED ROCK - Residual rock material with a standard penetration resistance (SPT) of more than 60 blows per foot, and less than refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.

ROCK FRAGMENTS - Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.

QUARTZ - A hard silica mineral often found in residual soils.

IRONITE - Iron oxide deposited within a soil layer forming cemented deposits.

CEMENTED SAND - Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other materials.

MICA - A soft plate of silica mineral found in many rocks, and in residual or transported soil derived therefrom.

ORGANIC MATERIALS (Excluding Peat) -

Topsoil - Surface soils that support plant life and which contain considerable amounts of organic matter;
Organic Matter - Soil containing organic colloids throughout its structure;
Lignite - Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).

FILL - Man made deposit containing soil, rock and often foreign matter.

PROBABLE FILL - Soils which contain no visually detected foreign matter but which are suspect with regard to origin.

LENSES - 0 to ½ inch seam of minor soil component.

LAYERS - ½ to 12 inch seam of minor soil component.

POCKET - Discontinuous body of minor soil component.

COLOR SHADES - Light to dark to indicate substantial difference in color.

MOISTURE CONDITIONS - Wet, moist, or dry to indicate visual appearance of specimen.

Test Boring Log General Notes

1. Numbers in the sampling data column indicate the number of blows required to drive a 2-inch O.D., 1-3/8 inch I.D. sampling spoon through three 6-inch intervals, or as indicated, using a 140-pound hammer falling 30 inches, according to ASTM D-1586.

2. Strata descriptions are based on visual inspection and are in accordance with the Unified Soil Classification System.

3. Refusal at the surface of rock, boulder, or obstruction is defined as a penetration resistance of 100 blows for 2 inches penetration or less.

4. Disintegrated rock is defined as residual earth material with a penetration resistance between 60 blows per 12 inches and refusal.

5. Key to abbreviations and symbols:

   MC = Moisture Content
   LL = Liquid Limit
   PL = Plastic Limit
   * = No Sample Recovery

6. The boring logs and related information depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the subsurface soil and groundwater conditions at the boring locations.

7. The stratification lines represent the approximate boundary between soils and/or rock types as evaluated in the drilling and sampling operation. Some variation may be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on the boring logs have been made with reasonable care and accuracy, but must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.

8. Estimated groundwater levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of the soil, site topography and similar factors.

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TEST BORING LOG

Project: Mount Weather Generator Compound, Clark & Loudoun Counties, Virginia

Boring Number: B-01
Contract Number: 06230030
Sheet: 1 of 1

Boring Contractor: Connelly and Associates, Inc.

Boring Foreman: T. Connelly

Drilling Method: 2-1/4 inch HSA

Drilling Equipment: CME ATV

SEA Representative: M. Osowski

Dates Started: 3/16/06 **Finished:** 3/16/06

Location: See Boring Location Plan

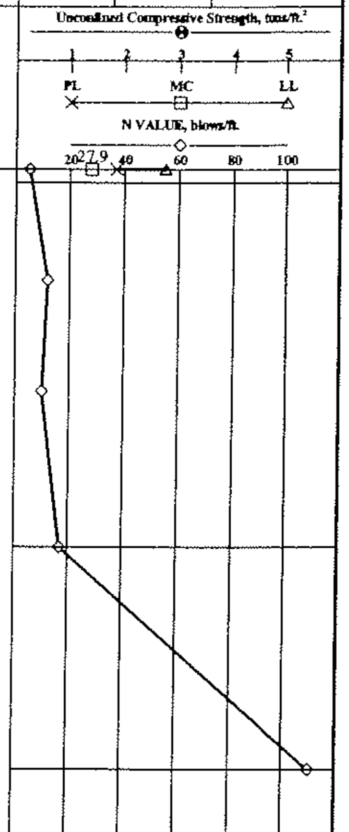
Hammer Type: Manual Safety

Ground Surface Elevation: 1620.8± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Not Encountered	3/16	—	—	—	12.0'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DEPTH	SAMPLING DATA
0.3	topsoil = 4 inch		1620.5	A			1+2+3
	sandy ELASTIC SILT, trace rock fragments, contains roots, moist, brown	MH					4+5+7
	moist, no roots at 5 ft					5	2+4+6
8.5	ELASTIC SILT, with sand, dry, yellowish-brown	MH	1612.3			10	4+5+12
13.5	DISINTEGRATED ROCK, dry, yellowish-brown, sampled as silt (MH), with sand	DR	1607.3	C			15+40+70
15.0	BOTTOM OF BORING @ 15.0 FT.		1605.8			15	



Comments:
1. BACKFILLED UPON COMPLETION.

TEST BORING LOG GAITHERSBURG MT. WEATHER.GPJ SCHNABEL.GDT 4/10/06

Schnabel Schnabel Engineering	TEST BORING LOG	Project: Mount Weather Generator Compound, Clark & Loudoun Counties, Virginia	Boring Number: B-02
			Contract Number: 06230030
			Sheet: 1 of 1

Boring Contractor: Connelly and Associates, Inc.

Boring Foreman: T. Connelly

Drilling Method: 2-1/4 inch HSA

Drilling Equipment: CME ATV

SEA Representative: M. Osowski

Dates Started: 3/16/06 **Finished:** 3/16/06

Location: See Boring Location Plan

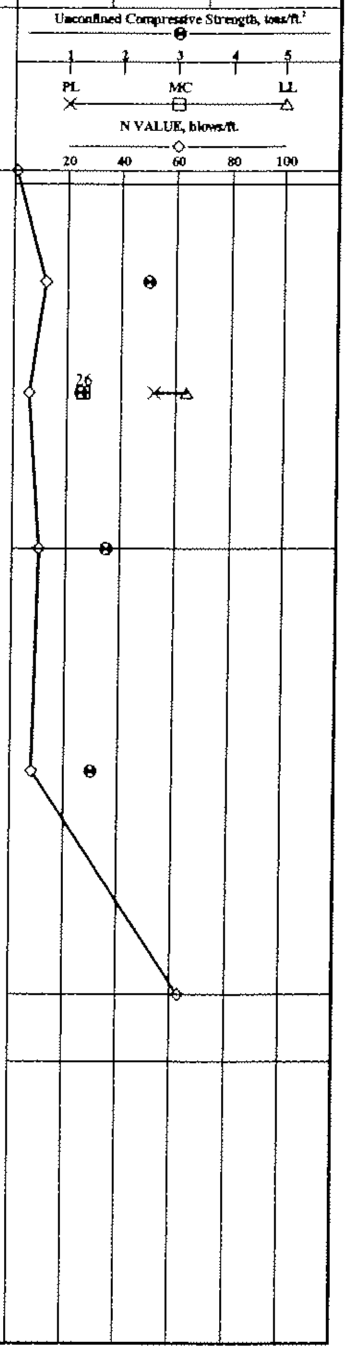
Hammer Type: Manual Safety

Ground Surface Elevation: 1621.0± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Not Encountered	3/16	—	—	—	15.0'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DEPTH	SAMPLING DATA
0.3	topsoil = 3 inches		1620.7				1+0+1
	ELASTIC SILT, with sand, contains roots and organics, moist, brown	MH					
	no roots or organics at 2. 5 ft						3+5+7
	trace sand, orange and reddish-brown at 5 ft					5	1+2+4
8.5	ELASTIC SILT, with sand, moist, orange-brown	MH	1612.5	A			3+4+6
						10	
							3+3+5
						15	
18.5	DISINTEGRATED ROCK, dry, yellowish-brown, sampled as silt (MH), with sand	DR	1602.5	C			6+18+45
20.0	BOTTOM OF BORING @ 20.0 FT.		1601.0			20	



TEST BORING LOG GAITHERSBURG MT. WEATHER.GPJ SCHNABEL.GDT 4/10/06

Comments:

1. BACKFILLED UPON COMPLETION.
2. UNCONFINED COMPRESSIVE STRENGTH MEASURED WITH POCKET PENETROMETER ON SPLIT SPOON SAMPLES.

Schnabel / Schnabel Engineering	TEST BORING LOG	Project: Mount Weather Generator Compound Clark & Loudoun Counties, Virginia	Boring Number: **B-03** Contract Number: 06230030 Sheet: 1 of 1

Boring Contractor: Connelly and Associates, Inc.

Boring Foreman: T. Connelly

Drilling Method: 2-1/4 inch HSA

Drilling Equipment: CME ATV

SEA Representative: M. Osowski

Dates Started: 3/16/06 **Finished:** 3/16/06

Location: See Boring Location Plan

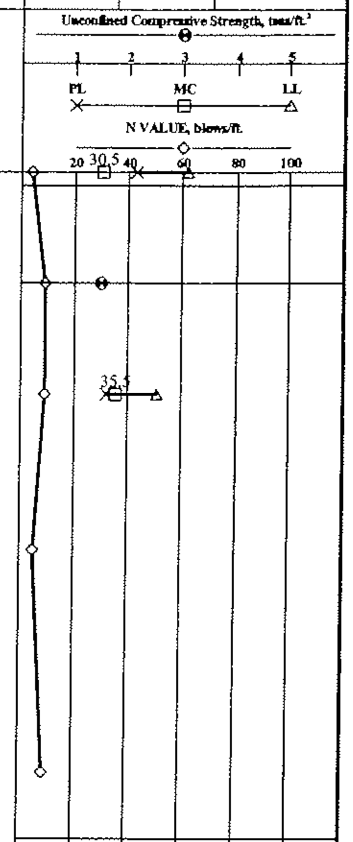
Hammer Type: Manual Safety

Ground Surface Elevation: 1611.5± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Not Encountered	3/16	---	---	---	11.5'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DEPTH	SAMPLING DATA
0.3	topsoil = 3 inches		1611.2				2+1+3
	silty SAND, with rock fragments, contains roots and organics, moist, orange-brown	SM					
2.5	ELASTIC SILT, with sand, moist, orange-brown	MH	1609.0				2+4+5
	orange and yellowish-brown at 5 ft					5	2+3+6
				A			3+2+3
						10	
							2+3+6
15.0	soft soil encountered to 14.5 ft BOTTOM OF BORING @ 15.0 FT.		1596.5			15	



TEST BORING LOG GAITHERSBURG MT. WEATHER.GPJ SCHNABEL.GDT 4/10/06

Comments:
1. BACKFILLED UPON COMPLETION.
2. UNCONFINED COMPRESSIVE STRENGTH MEASURED WITH POCKET PENETROMETER ON SPLIT SPOON SAMPLES.

Schnabel Engineering	TEST BORING LOG	Project: Mount Weather Generator Compound, Clark & Loudoun Counties, Virginia	Boring Number: **B-04**
			Contract Number: 06230030
			Sheet: 1 of 1

Boring Contractor: Connelly and Associates, Inc.

Boring Foreman: T. Connelly

Drilling Method: 2-1/4 inch HSA

Drilling Equipment: CME ATV

SEA Representative: M. Osowski

Dates Started: 3/16/06 **Finished:** 3/16/06

Location: See Boring Location Plan

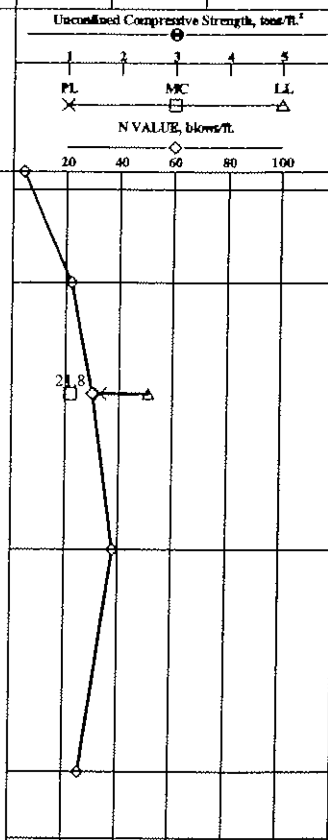
Hammer Type: Manual Safety

Ground Surface Elevation: 1607.5± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Not Encountered	3/16	---	---	---	7.5'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DATA
0.4	topsoil = 4 inches		1607.1			
	ELASTIC SILT, with sand and rock fragments, contains roots and organics, moist, brown	MH		A		2+2+2
2.5	silty ROCK FRAGMENTS, with sand, greenish-brown	GM	1605.0	B		4+5+17 20+12+18
8.5	silty SAND, dry, greenish-brown	SM	1599.0	B		12+20+18
13.5	sandy ELASTIC SILT, dry, brown	MH	1594.0	A		4+11+15
15.0	BOTTOM OF BORING @ 15.0 FT.		1592.5			



Comments:
1. BACKFILLED UPON COMPLETION.

Schnabel Engineering	TEST BORING LOG	Project: Mount Weather Generator Compound, Clark & Loudoun Counties, Virginia	Boring Number: B-05
			Contract Number: 06230030
			Sheet: 1 of 1

Boring Contractor: Connelly and Associates, Inc.

Boring Foreman: T. Connelly

Drilling Method: 2-1/4 inch HSA

Drilling Equipment: CME ATV

SEA Representative: M. Osowski

Dates Started: 3/16/06 **Finished:** 3/16/06

Location: See Boring Location Plan

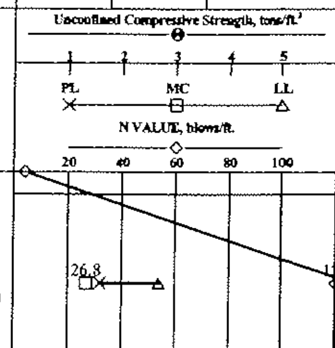
Hammer Type: Manual Safety

Ground Surface Elevation: 1610.3± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Not Encountered	3/16	---	---	---	4.0'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DEPTH	SAMPLING DATA
0.5	topsoil = 6 inches		1609.8				1+2+2
	sandy ELASTIC SILT, contains organics and roots, moist, brown	MH		A			
	no organics or roots below 2.5 ft						6+27+100
4.0	BOTTOM OF BORING @ 4.0 FT.		1606.3				



Comments:
1. BACKFILLED UPON COMPLETION.
2. AUGER REFUSAL ENCOUNTERED AT 4 FT.

TEST BORING LOG GAITHERSBURG MT. WEATHER.GPJ SCHNABEL.GDT 4/10/06

Schnabel Engineering

TEST BORING LOG

Project: Mount Weather Generator Compound
Clark & Loudoun Counties, Virginia

Boring Number: B-05A
Contract Number: 06230030
Sheet: 1 of 1

Boring Contractor: Connelly and Associates, Inc.
Boring Foreman: T. Connelly
Drilling Method: 2-1/4 inch HSA
Drilling Equipment: CME ATV
SEA Representative: M. Osowski
Dates Started: 3/16/06 **Finished:** 3/16/06
Location: See Boring Location Plan
Hammer Type: Manual Safety
Ground Surface Elevation: 1610.3± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Not Encountered	3/16	—	—	—	4.0'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DEPTH	SAMPLING DATA
0.5	topsoil = 6 inches		1609.8				1+3+4
	sandy ELASTIC SILT, contains organics and roots, moist, brown	MH		A			3+6+11
4.5	BOTTOM OF BORING @ 4.5 FT.		1605.8				

Unconfined Compressive Strength, tons/ft²: 1 2 3 4 5
PL MC LL
N VALUE, blows/ft: 20 40 60 80 100

TEST BORING LOG GAITHERSBURG MT. WEATHER.GPJ SCHNABEL.GDT 4/10/06

Comments:
1. BACKFILLED UPON COMPLETION.
2. AUGER REFUSAL AT 4.5 FT.

Schnabel Schnabel Engineering

TEST BORING LOG

Project: Mount Weather Generator Compound, Clark & Loudoun Counties, Virginia

Boring Number: B-06
Contract Number: 06230030
Sheet: 1 of 1

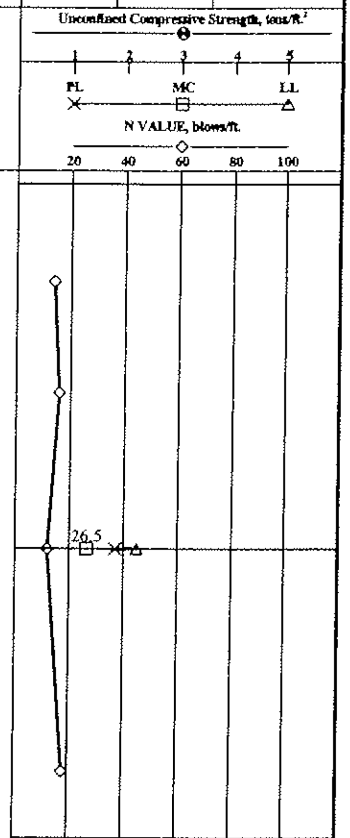
Boring Contractor: Connelly and Associates, Inc.

Boring Foreman: T. Connelly
Drilling Method: 2-1/4 inch HSA
Drilling Equipment: CME ATV
SEA Representative: M. Osowski
Dates Started: 3/16/06 **Finished:** 3/16/06
Location: See Boring Location Plan
Hammer Type: Manual Safety
Ground Surface Elevation: 1612.8± (feet)

Groundwater Observations

	Date	Time	Depth	Casing	Caved
Encountered	3/16	—	—	—	8.7'

DEPTH (ft)	STRATA DESCRIPTION	SYMBOL	ELEV. (ft)	STRATUM	WL	SAMPLING DEPTH	SAMPLING DATA
0.3	topsoil = 3 inches		1612.5				2+1+X
	ELASTIC SILT, with sand, contains roots and organics, moist, brown	MH		A			6+8+6*
	no roots or organics below 5 ft					5	8+8+8
8.5	silty SAND, trace rock fragments, moist, brown	SM	1604.3	B		10	4+5+7
	greenish brown and brown at 13.5 ft						10+9+9
15.0	BOTTOM OF BORING @ 15.0 FT.		1597.8			15	



TEST BORING LOG GAITHERSBURG MT. WEATHER.GPJ SCHNABEL.GDT 4/10/06

Comments:
1. BACKFILLED UPON COMPLETION.
2. * = NO RECOVERY
3. X = BOULDER ENCOUNTERED DURING DRIVING OF SPOON.

LEGEND

APPROXIMATE BORING LOCATION

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NOTES: –BASE PLAN PROVIDED BY CERVANTES AND ASSOCIATES ON MARCH 30, 2006
–NORTH DIRECTION APPROXIMATE

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(703) 779-0773 (703) 443-0510 FAX

MOUNT WEATHER GENERATOR COMPOUND
CLARKE AND LOUDOUN COUNTIES, VIRGINIA

BORING LOCATION PLAN	DATE: 3-31-06	DRAWN BY: MMO	CONTRACT No.: 06230030
	SCALE: AS SHOWN	CHECKED BY: WJM	FIGURE No.: A1

APPENDIX B
SOIL LABORATORY TESTING

- Summary of Soil Laboratory Test Results

Contract Number: 06230030.00
Project Name: Mount Weather

SUMMARY OF SOIL LABORATORY TEST RESULTS

BORING NO.	DEPTH (ft.)	STRATUM	DESCRIPTION OF SOIL SPECIMEN	SAMPLE CLASS.	SIEVE RESULTS		ATTERBERG LIMITS			NATURAL MOISTURE (%)	MODIFIED PROCTOR	
					PERCENT PASSING NO.200	PERCENT RETAINED NO.4	LL	PL	PI		MAX. DRY DENSITY (pcf)	OPT. M.C. (%)
B-1	0.0-1.5	A	Sandy ELASTIC SILT, trace rock fragments, brown	MH	62.3	9.7	55	37	18	27.9		
B-2	5.0-6.5	A	ELASTIC SILT with sand, brown	MH	77.7	0.0	64	52	12	26.0		
B-3	0.0-1.5	B	Silty SAND with rock fragments, contains wood, black-brown	SM	28.9	25.4	62	43	19	30.5		

NOTES:
1. Soil tests are in accordance with applicable ASTM standards.
2. Soil classification symbols are in accordance with Unified soil classification system, based on testing indicated and visual identification.
3. Visual identification of samples is in accordance with the system used by the firm.
4. Key to abbreviation: LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; NP = Nonplastic

Contract Number: 06230030.00
Project Name: Mount Weather

SUMMARY OF SOIL LABORATORY TEST RESULTS

BORING NO.	DEPTH (ft.)	STRATUM	DESCRIPTION OF SOIL SPECIMEN	SAMPLE CLASS.	SIEVE RESULTS		ATTERBERG LIMITS			NATURAL MOISTURE (%)	MODIFIED PROCTOR	
					PERCENT PASSING NO.200	PERCENT RETAINED NO.4	LL	PL	PI		MAX. DRY DENSITY (pcf)	OPT. M.C. (%)
B-3	5.0-6.5	A	Sandy ELASTIC SILT, contains roots, red-brown	MH	59.3	0.0	51	32	19	35.5		
B-4	5.0-6.5	B	Silty ROCK FRAGMENTS with sand, green-brown	GM	49.3	31.2	51	33	18	21.8		

NOTES:

1. Soil tests are in accordance with applicable ASTM standards.
2. Soil classification symbols are in accordance with Unified soil classification system, based on testing indicated and visual identification.
3. Visual identification of samples is in accordance with the system used by the firm.
4. Key to abbreviation: LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; NP = Nonplastic

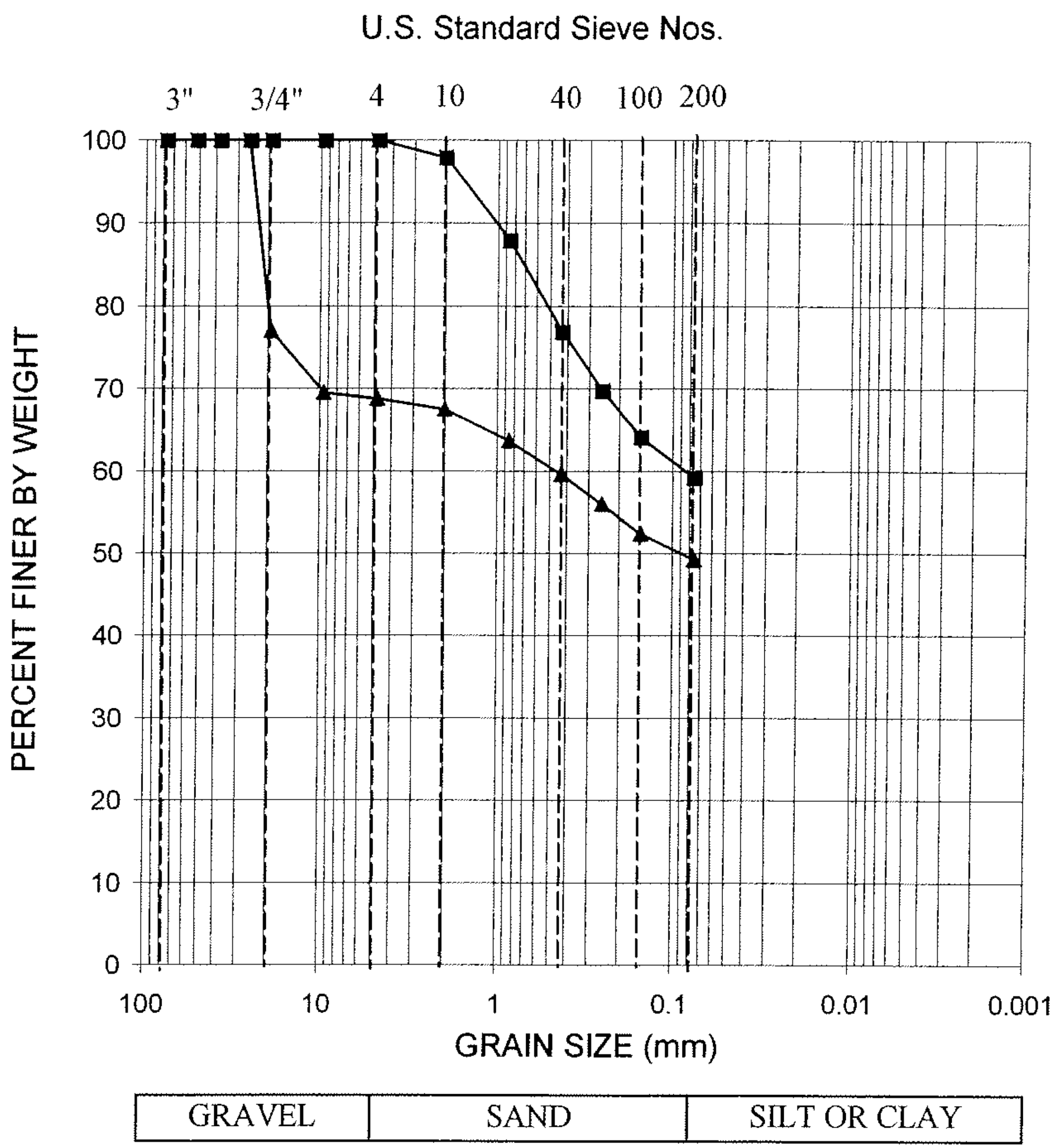
Contract Number: 06230030.00
Project Name: Mount Weather

SUMMARY OF SOIL LABORATORY TEST RESULTS

BORING NO.	DEPTH (ft.)	STRATUM	DESCRIPTION OF SOIL SPECIMEN	SAMPLE CLASS.	SIEVE RESULTS		ATTERBERG LIMITS			NATURAL MOISTURE (%)	MODIFIED PROCTOR	
					PERCENT PASSING NO.200	PERCENT RETAINED NO.4	LL	PL	PI		MAX. DRY DENSITY (pcf)	OPT. M.C. (%)
B-5	2.5-4.0	A	Sandy ELASTIC SILT with rock fragments, brown	MH	53.5	20.7	54	32	22	26.8		
B-6	8.5-10.0	B	Silty SAND, trace rock fragments, brown	SM	38.3	9.7	45	37	8	26.5		

NOTES:

1. Soil tests are in accordance with applicable ASTM standards.
2. Soil classification symbols are in accordance with Unified soil classification system, based on testing indicated and visual identification.
3. Visual identification of samples is in accordance with the system used by the firm.
4. Key to abbreviation: LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; NP = Nonplastic



Key	Sample	Depth(ft.)	Sample Description	Class.	LL	PI
■	B-3	5.0-6.5	Sandy EALSTIC SILT, contains roots, red-brown	MH	51	19
▲	B-4	5.0-6.5	Silty ROCK FRAGMENTS with sand, green-brown	GM	51	18

Schnabel Engineering North, LLC

GRADATION CURVES

Project:	Mount Weather
Contract No.	06230030.00
Date: 03/24/06	Method: ASTM D422